What is claimed is:

1. A coordinate measuring apparatus for measuring a workpiece, said coordinate measuring apparatus defining coordinate directions (x, y, z) and comprising:

a probe head movable in said coordinate directions (x, y, z);

a probe pin or probe pins which can be attached to said probe head;

said probe pin or said probe pins having a plurality of shafts having respective ends;

a plurality of contact bodies attached to corresponding ones of said ends of said shafts;

at least two of said shafts of one of said probe pins having different orientations when said probe pin is attached to said probe head;

a control and evaluation unit for controlling the measuring sequence and for evaluating the recorded measuring points;

said control and evaluation unit functioning to carry out a method including the steps of:

determining at least one characteristic direction datum ($\vec{n}_i$) for the points, which are to be measured, of a geometric element on said workpiece either from measured measuring points (P_1 to P_4) or from predefined desired data of said geometric element; and,

determining one or several probe shafts of the one or several of the measuring points of the geometric element which are suitable from said directional data ($\vec{n}_i$).

2. The coordinate measuring apparatus of claim 1, wherein said control and evaluation unit determines at least one vector ($\vec{n}_i$) for said geometric element as directional data.

3. The coordinate measuring apparatus of claim 2, wherein said control and evaluation unit assigns a vector ($\vec{A}_j$) to each of said probe shafts; and, said vector ($\vec{A}_j$) points in the longitudinal direction of said probe shaft.

4. The coordinate measuring apparatus of claim 1, wherein said control and evaluation unit determines a probe shaft as suitable; and, said probe shaft has a longitudinal direction and said longitudinal direction of said probe shaft and said directional datum ($\vec{n}_i$) of said geometric element conjointly define an angle (β_{ij}).

5. The coordinate measuring apparatus of claim 4, wherein said control and evaluation apparatus considers said angle (β_{ij}) as lying within a predefined angular region ($\beta_{ij} \pm \epsilon$).

6. The coordinate measuring apparatus of claim 2, wherein said control and evaluation unit uses the surface normal at at least one point of said geometric element as a vector ($\vec{n}_{Ai}$) of said geometric element for outer elements.

7. The coordinate measuring apparatus of claim 2, wherein said control and evaluation unit uses the vector, which points in the direction of the primary axis (a_z) of said geometric element, as a vector ($\vec{n}_{Ii}$) of said geometric element for inner elements.

8. The coordinate measuring apparatus of claim 5, wherein said control and evaluation unit defines said angle (β_{ij}) between the vector ($\vec{n}_i$) of said geometric element and the vector ($\vec{s}_j$) of said probe shaft as 180° ± ∈ or 0° ± ∈ where ∈ can assume a value between 0° and 90°.

9. The coordinate measuring apparatus of claim 1, wherein said control and evaluation unit, when scanning said geometric element with a probe shaft determined as not suitable, converts the measuring points, which were scanned with said probe shaft determined as unsuitable, to the probe shaft determined as suitable.

10. The coordinate measuring apparatus of claim 9, wherein said control and evaluation unit measures said geometric element with said probe shaft determined as suitable.

11. The coordinate measuring apparatus of claim 9, wherein said control and evaluation unit outputs a fault announcement for the case where no suitable probe shaft is found.

12. A method for measuring a workpiece on a coordinate measuring apparatus defining coordinate directions (x, y, z), the coordinate measuring apparatus includes: a probe head movable in said coordinate directions (x, y, z); a probe pin or probe pins which can be attached to said probe head; said probe pin or said probe pins having a plurality of shafts having respective ends; a plurality of contact bodies attached to corresponding ones of said ends of said shafts; and, at least

two of said shafts of one of said probe pins having different orientations when said probe pin is attached to said probe head; the method comprising the steps of:

determining at least one characteristic direction datum ($\vec{n}_i$) for the points, which are to be measured, of a geometric element on said workpiece either from measured measuring points (P_1 to P_4) or from predefined desired data of said geometric element; and,

determining one or several probe shafts of the one or several of the measuring points of the geometric element which are suitable from said directional data ($\vec{n}_i$).

13. The method of claim 12, wherein at least one vector ($\vec{n}_i$) for said geometric element as directional data is determined.

14. The method of claim 13, wherein a vector ($\vec{A}_j$) is assigned to each of said probe shafts; and, said vector ($\vec{A}_j$) points in the longitudinal direction of said probe shaft.

15. The method of claim 12, wherein a probe shaft is determined as suitable; and, said probe shaft has a longitudinal direction and said longitudinal direction of said probe shaft and the directional datum ($\vec{n}_i$) of said geometric element conjointly define an angle (β_{ij}).

16. The method of claim 15, wherein said angle (β_{ij}) lies within a predefined angular region ($\beta_{ij} \pm \epsilon$).

17. The method of claim 16, wherein said angle (β_{ij}) between the vector ($\vec{n}_i$) of said geometric element and the vector ($\vec{s}_j$) of

said probe shaft is 180° ± ∈ or 0° ± ∈ where ∈ can assume a value between 0° and 90°.

18. The method of claim 13, wherein the vector ($\vec{n}_{Ai}$) of said geometric element, for outer elements, is the surface normal of said geometric element in at least one point of said geometric element.

19. The method of claim 13, wherein the vector ($\vec{n}_{Ii}$) of said geometric element, for inner elements, is in the direction of the primary axis of said geometric element.

20. The method of claim 12, wherein, when scanning said geometric element with a probe shaft determined as not suitable, the measuring points, which were scanned with said probe shaft determined as unsuitable, are converted to the probe shaft determined as suitable.

21. The method of claim 12, wherein said geometric element is measured with said probe shaft determined as suitable.

22. The method of claim 12, wherein a fault announcement is outputted for the case where no suitable probe shaft is found.